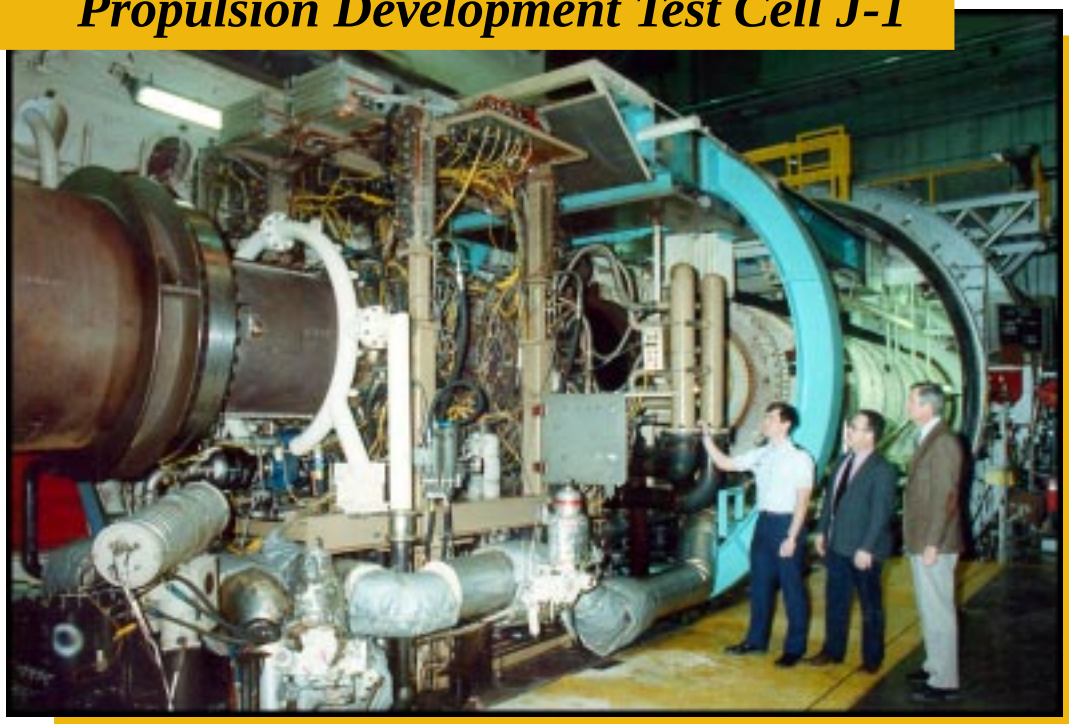
# *ENGINE TEST FACILITY*
## *Propulsion Development Test Cell J-1*



Engine Test Facility (ETF) - Propulsion Development Test Cell J-1 is located at Arnold Engineering Development Center, Arnold Air Force Base, Tennessee. The J-1 is an altitude test cell used to perform turbojet, turbofan, turboshaft, ramjet, aerodynamic models, or combined aerodynamic inlet and propulsion system tests. Fixed Mach Number Free Jet, or Direct-Connect tests of air-breathing propulsion systems to a simulated Mach number of 3.2 can be accomplished. It is primarily used for Direct-connect performance and stability testing of large air-breathing propulsion systems, although free-jet testing can be accommodated.

# *PROPULSION DEVELOPMENT TEST CELL J-1*

**Test Cell Dimensions:**
Length: 65 ft
Diameter: 16 ft
Inlet Plenum Diameter: 8 ft

**Environmental Capabilities:**
Altitude (ft): Sea Level to 80,000
Total Pressure (psia): up to 120
at the air inlet to the test cell
Total Temperature (°F): -65 to 750
Airflow (lb/sec): 0 to 1400
Installed Thrust Stand Capacity (lbs): 50,000 (on-stand calibration: 32,000)

**Soak Capabilities:**
Maximum Temperature (°F): 170
Minimum Temperature (°F): -65
The entire test cell is not brought to temperature, but instead, the engine is enclosed in a special set-up box (engine specific) that is brought to temperature. Soak duration is unlimited.

**Power Absorption:**
J-1 has a 600 Hp extraction water brake that can be used in this cell.

**Data Processing Capabilities:**
ETF data processing capabilities provide pre-test, test, and post-test data reduction and analysis. General programs are available for processing data acquired by the digital data acquisition system. These programs calculate calibration factors, convert raw data to engineering units, calculate performance analysis parameters, generate hard copy tabulations and plots, provide interactive alphanumeric and graphics displays, and supply inputs for special-purpose processing programs. New programs may be developed as needed to meet specific test-unique data reduction and analysis requirements. In addition to real-time displays, data available for analysis / review during testing include all steady-state condition parameters and selected portions of time-dependent parameters. General data reduction programs are available for off-line processing of data recorded in the form of frequency-analog signals.

**Unique Features:**
High accuracy measurement for multi-component thrust (axial, vertical side forces) is available. The test cell inlet airflow measuring system consists of five fixed and four remotely operated venturis.

*For more information on Engine Test Facility - Propulsion Development Test Cell J-1 at Arnold Engineering Development Center, Arnold Air Force Base, TN, contact 615-454-5851.*

## INSTRUMENTATION CAPABILITIES:

| **Steady State** | **Temperature** | **Pressure** |
|---|---|---|
| Number of Channels: | 536+ | 512+ |
| Range: | -300 to 3000°F/Varies | 5 to 600 psia |
| Sampling Rate | -------20+ samples/sec/channel------- | |

| **Transient** | **Temperature** | **Pressure** | **Vibrations** |
|---|---|---|---|
| Number of Channels: | 536+ | 200+ | 24+ |
| Range | -300 to 3000 °F | Varies | Varies |
| Sampling Rate: | -------200+ samples/sec/channel------- | | |